BEFORE THE
Federal Communications Commission
WASHINGTON, D.C.

In the Matter of	)	
	)	
Section 68.4(a) of the Commission's Rules	)	
Governing Hearing Aid Compatible Telephones	)	WT Docket No. 01-309
	)	RM-8658
	)	

COMMENTS OF THE CELLULAR TELECOMMUNICATIONS & INTERNET ASSOCIATION

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The Cellular Telecommunications & Internet Association ("CTIA")[1] respectfully submits these comments in response to the Notice of Proposed Rulemaking released in the above-captioned proceeding.[2]

INTRODUCTION

The wireless industry continues to work diligently to enable wireless consumers who use hearing aids or who have cochlear implants to take advantage of digital wireless technologies and services. Our goal is to provide wireless products and services to anyone who desires them. Over the past seven years, the wireless industry has devoted significant time, research, resources and some of its best technical expertise to address the technical challenges of hearing aid

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[1] CTIA is the international organization of the wireless communications industry for both wireless carriers and manufacturers. Membership in the association covers all Commercial Mobile Radio Service ("CMRS") providers and manufacturers, including cellular, broadband PCS, ESMR, as well as providers and manufacturers of wireless data services and products.

[2] In the Matter of Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones, WT Docket No. 01-309 RM-8658, Notice of Proposed Rulemaking, FCC 01-320 (rel. Nov. 14, 2001) ("Notice").

compatibility and interference in a dynamic digital RF environment.[3] Despite the wireless industry's unwavering commitment to this effort, the evidence overwhelmingly demonstrates that the FCC's hearing aid compatibility standard,[4] does not guarantee accessibility to digital wireless technologies and services. Usability, not a hearing aid compatibility requirement designed for wireline products, should guide the Commission's inquiry. Imposing a regulatory mandate that requires internal coupling between hearing aid devices and all digital wireless phones does not resolve the separate and distinct issue of interference. The Commission will still be confronted with the basic fact that digital wireless phones are designed to transmit RF energy, and hearing aids are receivers designed to amplify certain sounds or audio frequencies. While the Commission poignantly noted in the Notice that "ideally, a hearing aid compatible digital wireless phone would have a high degree of compatibility coupled with a low degree of interference,"[5] it is not technically feasible to provide such an ideal RF environment without compromising the operational effectiveness of digital wireless technologies and networks. Accordingly, the Hearing Aid Compatibility Act ("HAC Act")[6] and the evidence do not support revocation or limitation of the statutory exemption that Congress carved out for mobile telephones.

While there is no single, finite methodology for solving this complex problem, the wireless industry has not abandoned its underlying goal: to enable its customers who wear hearing aids or who have cochlear implants to take advantage of digital wireless technologies

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3 See CTIA Comments, at 2.

4 47 C.F.R. §§ 68.4(a) and 68.316 (2000).

5 Notice at ¶ 8.

6 47 U.S. C. § 610 (2001).

and services. Accordingly, the wireless industry supports a multifaceted approach that will achieve access through usability rather than internal coupling. This multi-faceted approach will require assistance from the Food and Drug Administration ("FDA"), particularly the FDA's expertise on hearing aids and its jurisdictional authority over hearing aid manufacturers. In addition, the Commission should look to the experience in other countries, and how their regulatory agencies have managed the RF interference phenomenon, particularly in Australia and Europe. Faced with the same technologies and technical challenges, both European and Australian researchers and standards-setting bodies are utilizing a pragmatic and common scientific approach wherein primary efforts are focused on increasing the immunity of the hearing aid, increasing the distance between the phone and the hearing aids, and extensive public education campaign.

I. Hearing Aid Compatibility and RF Interference Are Two Distinct Technical Concepts that Require Very Different Approaches with Respect to Providing Reasonable Access to Telephone Service, Particularly Digital Wireless Technologies and Services.

The terms, "hearing aid compatibility" and "interference" are used interchangeably in the Notice, which obscures the true issue and the congressional intent of the Hearing Aid Compatibility Act: accessibility.[7] Hearing aid compatibility and RF interference are two distinct technical concepts that require very different approaches with respect to providing reasonable access to telephone service for individuals who are hard of hearing, particularly with respect to access to digital wireless phones and networks.

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[7] See 47 U.S.C. § 610(a). See also H.R. REP. NO. 100-674, at 3 (1988) ("This legislation endeavors to ensure that all hearing impaired persons will have complete access to the telephone network.").

The HAC Act and the FCC's Part 68 requirement for hearing aid compatibility require a very narrow and limited technical approach that dictates inductive coupling between the hearing aid and the phone as a preferred way for individuals who are hard of hearing to have reasonable access to wireline telephones. While Congress may have intended a broader definition for the term, "hearing aid compatible,"[8] the term has become synonymous with inductive coupling whereby the phone leaks an electromagnetic field and a telecoil, a small copper wire inside the hearing aid, picks up the voice signal from the electromagnetic field.[9]

RF interference, on the other hand, is a phenomenon between two electronic devices wherein one device, the digital wireless phone, transmit energy at authorized frequencies (800 MHz/Cellular and 1900 MHz/PCS)[10] in accordance with strict technical standards,[11] interacts with another electronic device, the hearing aid, which is a very specialized receiver designed to receive and process audible signals. While the telecoil may be optimal in an analog, wireline environment, the telecoil acts a receiver and converts the baseband or low level frequencies of digital signals into noise, and therein lies the technical challenge.

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8 See S. REP. NO. 100-391, at 2 (1988).

9 See infra Section II.B.

10 See 47 C.F.R. §§ 22.905, 24.229.

11 CDMA IS-95, TDMA IS-136, GSM North America PCS-1900, and iDEN, which is proprietary technology developed by Motorola.

II. With the Passage of the Hearing Aid Compatibility Act, Congress Envisioned A Regulatory Scheme That Would Ensure Reasonable Access to Telephone Service Through a Method of Internal Coupling Between the Phone and Hearing Aid Device.

As indicated by the legislative history, the Hearing Aid Compatibility (HAC) Act was intended to ensure access to traditional – wireline -- telephone service through compatibility, and Congress specifically mandated that such compatibility must be achieved through internal means.[12]

A. The definition of hearing aid compatibility is a term of art used to denote internal coupling.

The HAC Act directed the Commission to promulgate rules that require certain telephones to "provide internal means for effective use with hearing aids that are designed to be compatible with telephones which meet established technical standards for hearing aid compatibility."[13] Congress also acknowledged that "the primary means of achieving compatibility is through magnetic coupling of a telecoil"[14] and the electromagnetic field produced by a wireline telephone. Subsequently, the FCC established a definition that not only incorporated the statutory definition of hearing aid compatibility through internal means but also

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12 See S. REP. NO. 100-391, at 10. See also H.R. REP. NO. 100-674, at 11.

13 47 U.S.C. § 610(b)(1) (2001).

14 S. REP. NO. 100-391, at 10. See also H.R. REP. NO. 100-674, at 11.

The House Committee noted that the definition of compatibility did not require induction as the sole method of telephone and hearing aid coupling, and the definition was flexible to allow for other methods of compatibility. However, the Committee required the FCC, in its initial rulemaking, to maintain the existing definition and field strength standards for hearing aid compatibility that were set forth in 47 C.F.R. § 68.316, *i.e.,* inductive coupling standard.

required that certain telephones comply with a specific technical standard that codified inductive coupling as the sole means to achieve compatibility.[15] Consequently, the term, "hearing aid compatibility" became synonymous with inductive coupling.

While Congress may have intended a flexible and broad definition with respect to achieving compatibility through internal means, Congress also acknowledged that internal coupling between mobile phones and hearing aids would not achieve the desired effect of compatibility. "Background ambient noises and magnetic fields associated with mobile communications often *interfere* with the inductive transmission between the hearing aid and the telephone handset, thus making compatibility impossible."[16] Accordingly, Congress exempted mobile phones from the "internal means" requirement with the hope that advances in both telephone and hearing aid technologies may provide greater access in the future.[17] Congress also granted the Commission authority to periodically review the appropriateness of continuing the exemptions and required the Commission's assessment to consider not only the public interest and the adverse effect on hearing-impaired individuals, but equally important, whether compliance with the definition of hearing aid compatibility is technologically feasible and whether such compliance would increase the costs to such an extent that the mobile phone could not be successfully marketed. While Congress provided clear guidance on the factors that the

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15 47 C.F.R. § 68.316 (2001)

16 H.R. REP. NO. 100-674, at 9, 13. See also, In the Matter of Access to Telecommunications Equipment and Services by the Hearing Impaired and other Disabled Persons, 4 FCC Rcd 4596, 4600 (1989) (emphasis added)("The provision for telephones used with public mobile services was crafted by Congress because it was demonstrated that there was a potential for interference between hearing aids and the mobile telephone when operated in that environment, making operational compatibility impossible in that case.")

17 See Hearing Aid Compatibility Act of 1988, Pub. L. No. 100-394, § 2, 102 Stat. 976 (1988). See also S. REP. NO. 100-391, at 6-7.

FCC must consider before revoking or limiting the exemption, Congress also carved out a specific exemption for new technologies. Congress clearly sought to ensure that this statutory framework does not freeze or inhibit technological advances and growth in telecommunications.[18]

B. Merely imposing HAC requirement on digital wireless phones will not resolve the interference issue and falls short of addressing the true issue: usability.

Section 68.316 of the Commission's rules sets forth the technical criteria for hearing aid compatibility by means of inductive coupling between a wireline phone and a hearing aid.[19] The technical standard requires telephone handsets to "leak" (or radiate) a uniform, low-level magnetic field to which hearing aids can couple. Wireline phones generally use speakers that radiate this magnetic field which then can be picked up by a hearing aid equipped with a telecoil. The telecoil picks up audio signals from the low-level magnetic field radiated by the phone and delivers the processed sound directly into the hearing aid wearer's ear. In addition to a "leaky" speaker, this type of internal means of hearing aid compatibility requires a hearing aid equipped with a telecoil and a switch that allows the wearer to turn off the microphone in the hearing aid while the telecoil is in use. Approximately 20 percent of hearing aids are equipped with a telecoil.[20] Essentially, the use of the telecoil allows the hearing aid to avoid the acoustic noise or feedback that the hearing aid's microphone often picks up and amplifies. Inductive coupling,

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[18] See 47 U.S.C. § 610(b)(3). See also H.R. REP. NO. 100-674, at 8-10 (acknowledging that manufacturers must also have the freedom to develop new products and technologies. "Products and services that cannot be made hearing aid compatible will not have to be compatible. Technol0gy will not be frozen."). Accord S. REP. NO. 100-391, at 6-7.

[19] 47 C.F.R. § 68.319.

[20] See AG Bell Comments at 3-4.

however, can pick up not only audio signals from the magnetic field but also other energy sources transmitting in close proximity. Thus, the very standard designed to achieve compatibility through internal coupling between the phone and a hearing aid equipped with a telecoil does not guarantee interference-free use of a phone. The EIA standards body clearly understood the technical limitations of a standard based upon inductive coupling:

> [D]ue to the wide range of customer apparatus and loop plant and *dependent upon the environment in which the telephone and hearing aid are used*, conformance with this standard does not guarantee acceptable performance or interface compatibility *under all possible operating conditions*. [21]

The hearing aid compatibility standard was designed for a "wired" environment wherein phone transmissions are sent via wire and fiber optics, and are not designed to produce an extraneous electric or magnetic field other than the low-level magnetic field that emanates from the handset to allow the hearing aid to couple with the phone.[22] Conversely, wireless phones are designed to transmit RF energy under authorized frequencies and technical standards, and a telecoil is not always immune from picking up these RF signals. Thus, the very nature of the FCC's HAC requirement by means of inductive coupling indicates that imposing a similar requirement on digital wireless phones will not resolve the interference issue and falls short of achieving the mutual goal of usability.

Furthermore, requiring all digital wireless phones to meet the FCC's hearing aid compatibility technical standard implicates a significant disruption in the current design and manufacturing process of digital wireless phones. Manufacturers design and build phones on global platforms that cannot be easily or quickly modified. Imposing an inductive coupling

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[21] 47 C.F.R. § 68.316, ¶ 2.1 (1983)(emphasis added).

[22] For this reason, cordless (wireline) phones that must be HAC compliant may not be usable due to interference from the phone's RF emissions.

requirement will necessitate additional components to the phone. Adding such components may require significant modifications to the design, size and operational capabilities of phones already in the market as well as phones currently in the design phase of the manufacturing process. Redesigning digital wireless phone platforms and the phone itself to accommodate inductive coupling, particularly when scientific evidence demonstrates that inductive coupling will not fix the problem of interference, burden the wireless industry and its customers with no corresponding benefit in achieving the goal of usability. This also contravenes the balance Congress established when it directed the FCC to promulgate regulations that encourage hearing aid compatibility through internal coupling and specifically instructed the FCC to ensure that such regulations do not create disincentives or impede the development and design of new communications technologies and services.[23]

While the Commission may encourage the use of inductive coupling in phones as one approach that will achieve compatibility for the 20 percent of hearing aid wearers who have telecoils, it cannot do so in a manner that binds phone manufacturers to a particular technology or method of producing and designing digital wireless phones.[24]

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[23] See 47 U.S.C. §§ 610(b)(3) and 610(e) (2001).

[24] See H.R. REP. NO. 100-674, at 8

III. To Achieve the Mutual Goal of Usability, One Must Understand the Phenomenon of RF Interference Between Hearing Aids and Digital Wireless Technologies and Whether Mitigation of Such Interference Is Technically Feasible and Readily Achievable.

Hearing aids essentially consist of a microphone, a processor and an amplifier and are designed for an individual's unique hearing loss.[25] The function of a hearing aid is to: 1) receive or "pick up" audio signals (a.k.a. sounds or frequencies) through the microphone, 2) process and amplify the specific sounds that the wearer requires as a result of his or her hearing loss, and 3) deliver the processed sound directly into the wearer's ear canal through a speaker.[26] While all hearing aids include these basic components and functions, approximately 20 percent of hearing aids have an additional feature, a telecoil.

Digital wireless phones must operate at authorized frequencies and must emit RF energy in accordance with specific technical standards in order to operate properly. Digital wireless phones are radios designed to be intentional radiators of radio frequency (RF) signals[27] and designed to operate within the radio frequency bands and the power levels authorized and licensed by the FCC, *i.e.,* 800 MHz (cellular) and 1900 MHz (PCS). They also must comply with other tolerance levels specified by the FCC.[28] Digital wireless phones are also designed to meet specific air interface technical standards, *i.e.,* TDMA, GSM, CDMA, iDEN, which specify

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[25] In addressing this issue, it is helpful to understand the degree, type and configuration of hearing loss. See American Speech-Language-Hearing Association, *Hearing Assessment* (visited Jan. 7, 2002) < http://www.asha.org/hearing/testing/assess.cfm>.

[26] Qiang Xu, Audio/Acoustic Engineer, Nokia Mobile Phones, Presentation at FCC Tutorial on Wireless Phones and Hearing Aid Usability (Jan. 10, 2002)(attached as Exhibit A).

[27] See 47 C.F.R. Part 2, Subpart J and Part 15, Subpart C.

[28] See, e.g., 47 C.F.R. §223.55

how the 800 MHz or 1900 MHz radio frequency signal must be transmitted over the air to the network. While analog wireless phones transmit the radio frequency signal in a continuous sine wave, digital wireless phone transmit the radio frequency signal in multiple individual pulses of information.

While the microphone in the hearing aid enables the wearer to hear more clearly, it also may detect and pick up these high frequency radio signals intentionally transmitted by a digital wireless phone in close proximity.[29] In its submission to the Australian Human Rights and Equal Opportunity Commission, Telstra accurately explained how the hearing aid processes these RF signals.

> When the amplitude of those radio signals [emitted by digital wireless phones] varies at an audible rate, the hearing aid attempts to recover information from those signals by a process known as 'audio rectification.' The user may therefore experience electromagnetic interference which may be heard as a static-like buzzing in his or her aid.[30]

The level of the electromagnetic interference is influenced by several factors, including:

(a) the unique configuration of a person's hearing loss

(b) the immunity of the hearing aid to electromagnetic interference

(c) the type of hearing aid (in-the-ear hearing aids vs. behind-the-ear hearing aids)

(d) the orientation of the hearing aid

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[29] See Telstra Corporation Limited, *Submission to the Human Rights and Equal Opportunity Commission Inquiry under the Disability Discrimination Act, 1992 into Digital Mobile Phones, Hearing Aids and Electromagnetic Interference* 2 (Fall 1999)("Telstra Submission"). Attached hereto as Exhibit B.

[30] Id.

(e) the amount of shielding provided by the body, *e.g.,* the head of the hearing aid wearer

(f) the distance between the digital wireless phone and the hearing aid

(g) the frequency of the radio signal emitted by the digital wireless phone

(h) the strength of the radio signal (which fluctuates based on capacity, distance from the base station, terrain, etc.)

(i) the maximum amount of power radiated by the phone which varies among digital wireless technologies

(j) the vocoder rate which varies with network conditions.[31]

Technical experts from both the hearing aid and wireless industries acknowledge that hearings aids with low immunity levels are susceptible to RF interference not only from digital wireless phones but also from a plethora of electronic devices, such as computers, digital televisions, security systems, fluorescent lights, all of which are unintentional radiators of RF electromagnetic energy.[32] The presence of these devices in close proximity to a hearing aid also contributes to the level of interference. However, unlike these other electronic devices, digital wireless phones must transmit RF energy. A wireless phone does not work if it does not radiate RF energy or signals.

Addressing the interference by altering the fundamental characteristics of this intentional transmission can significantly harm the operational effectiveness of the digital mobile phone and

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[31] See Telstra Submission, at 2; See also University of Oklahoma Wireless EMC Center, *Study of the Interaction of Wireless Phones and Hearing Aids*, Executive Summary, 3 (visited Dec. 28, 2001) http://www.ou.edu/engineering/emc/projects ("OU Studies"); ERIC BURWOOD, NATIONAL ACOUSTIC LABORATORIES, ASSESSMENT OF INTERFERENCE TO HEARING AIDS USED IN AUSTRALIA BY CDMA DIGITAL MOBILE PHONES 3 (1999) ("NAL CDMA Research Report").

[32] 47 C.F.R. Part 15, Subpart B.

impact the efficient operation of digital wireless networks to the detriment of users. Digital wireless networks are designed and constructed to ensure that the phone and base stations emit and receive RF signals within authorized frequency bands, *i.e.,* 800 MHz (cellular) and 1900 MHz (PCS) and power levels. The operational effectiveness of this intentional emission is a function of several factors: vocoder rate and signal strength and power level, which must constantly respond to changing network conditions, such as capacity, terrain and water, weather conditions. Altering or blocking any one of these factors has a significant impact with respect to the digital mobile phone's ability to "talk to" the base station. The result is either poor performance or dead air.

Researchers have concluded that:

> The interference mechanism is intimately associated with the essential nature of the ultra high frequency emissions of digital mobile phones. *It is not an incidental by-product which might, for example, be solved by improved shielding of the mobile phone themselves.* However, interference could be reduced by modifying hearing aids by reducing the size of the effective antenna in the hearing aid which responds to signals in the 900 MHz range, covering the aid in electrostatic shielding and using shunt capacitors.[33]

Technical experts agree that while eliminating or reducing interference through the mobile phone is not a technically viable approach, increasing the immunity level of hearing aids as well as increasing the distance between the hearing aid and digital wireless device are valid

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[33] Telstra Submission, at 2-3 (emphasis added). See also J. LESTRANGE, E. BURWOOD, D. BYRNE, K. JOYNER, M. WOOD, & G. SYMONS, NATIONAL ACOUSTIC LABORATORIES, INTERFERENCE TO HEARING AIDS BY THE DIGITAL MOBILE TELEPHONE SYSTEM, GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS, (GSM), NAL Report No. 131, 47-49 (1995) ("NAL Report No. 131").

scientific and pragmatic approaches to mitigating interference problems and successfully achieving the goal of usability.[34]

IV. There Is No Single, Finite Solution That Will Achieve the Mutual Goal of Usability Because the Mitigation of Interference Is A Complex Problem That Requires Several Approaches.

Mitigating interference is a complex problem that requires a multi-faceted or a combination of several approaches that offer consumers options with respect to the use of digital wireless phones with hearing aids. While there is no single approach that will serve all individuals who wear hearing aids or who have cochlear implants, a combination of approaches will allow a significant majority of individuals who are hard of hearing to use a digital wireless phone with a hearing aid or cochlear implant with minimal or no interference.

A. Increase hearing aid immunity level

For those consumers who choose to purchase hearing aids with a higher level of immunity, there are some models on the market that can be used successfully with some digital wireless phones. In some instances, the increased immunity level has been a by-product of the

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[34] See European Hearing Instrument Manufacturers Association, *Mobile Phones, Cordless Phones and Hearing Aids* ("EHIMA FAQ")(visited Jan. 8, 2002) <http://www.ehima.com/frame.pl?area=3> (acknowledging the adoption of international standard that sets the level of immunity for hearing aids, and stating that new product of all EHIMA member companies meet the specifications of the standard. Also provides suggestions on how consumer can mitigate interference, *i.e.,* use of hands free kits, loop sets, more immune hearing aid.) See also, Australian Hearing, *Digital Telephones and Hearing Aids* (visited Dec. 11, 2001) http://www.hearing.com.au/nal_research_areas.htm > (provide suggestions on how Australian consumers can mitigate interference when using a CDMA phone in weak reception areas. If interference persists or continues to be annoying, suggests the use of an accessory device to increase the distance between the hearing aid and mobile phone); NAL CDMA Report, at 4; NATIONAL TELECOM AGENCY DENMARK, INTERFERENCE WITH HEARING AIDS CAUSED BY GSM DIGITAL CELLULAR TELEPHONES AND DECT DIGITAL CORDLESS TELEPHONES, *Conclusive Report by the Working Group on GSM and DECT Telephones and Hearing Aids* 30 (1994) ("Denmark Study"); O. LAURIDSEN, TELECOM DENMARK TELEABORATORIET, EMC AND NEW MODULATION TECHNOLOGIES 11 (1994) ("Lauridsen Study").

natural evolution in the development and design of hearing aids. However, this gradual improvement in hearing aid immunity can also be attributed to several significant events. First, the Hearing Aid Summit, research activities, and the standards process brought the issue of RF interference and the susceptibility of hearing aids with many digital devices to the forefront.[35] Hearing aid manufacturers have come to appreciate that they must address the susceptibility of hearing aids if their customers, the nation's hearing aid users, are to participate in a meaningful way in today's digital world.

Second, the adoption of standards for hearing aid immunity is another significant event. In Europe and Australia, hearing aid manufacturers are addressing the susceptibility of hearing aids to RF interference by incorporating the relevant standards for hearing aid immunity into their products.[36] In Australia, all hearing aids manufactured after July 1, 1999, must comply with the Class C1 standard, and existing inventory of non-compliant hearing aids could be sold until July 1, 2001. Compliance with the Class C2 standard, however, is voluntary.[37] In 1997, the International Electrotechnical Commission ("IEC") adopted an international standard for hearing

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35 See CTIA Comments, at 6.

36 National Acoustic Laboratories' ("NAL") research led to the development of an Australian standard (AS 1088.9) for hearing aid immunity. AS 1088.9 specifies two standards for hearing aid immunity: 1) Class C1, released in May 1995, specifies the immunity level of a hearing aid for use in an environment when a digital mobile phone is used a meter or more away, *i.e.,* far-field or bystander interference; 2) Class C2, released in July 1996, specifies the immunity level of a hearing aid for use in an environment where a digital mobile phone is used next to or in close proximity the hearing aid wearer's ear, *i.e.,* near-field interference. See Telstra Submission, at 3. See also NAL Report No. 131, at 49 (NAL researchers strongly recommended that all new hearing aids meet the Class C2 requirement); International Electrotechnical Commission, *Hearing aids - Part 13: Electromagnetic compatibility (EMC)*, Document No. IEC 60118-13, 1st Ed., (1997) ("IEC 60118-13"); EHIMA FAQ, at 1.

37 Telstra Submission, at 3.

aid immunity similar to the Australian Class C1 standard.[38] According to the European Hearing Instrument Manufacturers Association ("EHIMA"), while new products of all EHIMA member companies meet the specifications of the standard, "older hearing aids may have problems as they were made before this difficulty was apparent."[39]

In the United States, efforts to increase the immunity level of hearing aids have been on a purely voluntary basis. TIA rightly noted in its comments that the wireless industry has worked successfully and voluntarily with several hearing aid manufacturers to incorporate proper shielding into their designs to allow successful operation with digital wireless devices. However, there has been no concerted government effort to impose hearing aid immunity standards or requirements on hearing aids manufactured and sold in the United States. While CTIA recognizes that the FCC does not have jurisdiction over hearing aid manufacturers, CTIA strongly recommends that the FCC garner assistance from the Food and Drug Administration, particularly the FDA's expertise on hearing aids and its jurisdictional authority over hearing aid manufacturers.

For those hearing aid consumers who choose not to purchase a hearing aid with a high immunity level, there is another option: return the hearing aid device to the manufacturer for increased immunity. At a July 2001 meeting among the stakeholders, a representative of the Hearing Industry Association ("HIA") indicated that hearing aid manufacturers are currently addressing the interference and susceptibility issue on a case-by-case basis. Specifically, if a consumer is experiencing interference between the hearing aid and the digital wireless phone, the consumer can return the hearing aid to the manufacturer for an adjustment, which may involve

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38 See IEC 60118-13, at 1.

39 EHIMA FAQ, at 1.

increasing the immunity level of the hearing aid either through shielding or a decoupling technique.[40]

National Acoustic Laboratories ("NAL"), the research division of Australian Hearing, reports that changes in hearing aid microphones also show promising results that have "considerably improved the prospect of producing hearing aids that are not affected by digital mobile telephones."[41] Specifically, several manufacturers have recently introduced new hearing aid microphones that are hardened or made more resistant to picking up the RF signals transmitted by digital mobile phones. Early test results indicate a significant reduction in interference by replacing the standard hearing aid microphone with the more resistant microphone. NAL indicates that the new GSM resistant microphones are "slightly more expensive than the standard microphone but are a very cost-effective way to make a hearing aid more resistant to the interference."[42]

B. Increasing the distance between a hearing aid and digital wireless device

Several research studies and technical experts conclude that increasing the distance between a hearing aid and digital wireless device is a viable approach to mitigating interference.[43] Increasing the distance can be achieved through the use of accessory devices such

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40 See *Hearing Aid and Digital Wireless Phone Compatibility, Summary of Meeting, July 2, 2001*, at 3. Attached as Exhibit C.

41 Australian Hearing, *Digital Telephones and Hearing Aids* (visited Dec. 11, 2001) <http://www.hearing.com.au/nal_research_areas.htm>.

42 Id.

43 See EHIMA FAQ, at 2-3; *Digital Telephones and Hearing Aids,* at 1; Telstra Submission, at 3; EHIMA, *Final Report: Hearing aids and GSM Mobile Telephones: Interference Problems, Methods of Measurement and Levels of Immunity*, EHIMA GSM Project (1995) ("EHIMA Final Report").

as hands-free kits, loopsets and other telecoil accessory devices, which are widely available today. Such devices allow the phone to be used away from the hearing aid thereby significantly reducing the level of interference. Loopsets and other t-coil accessory devices require the use of a hearing aid equipped with a telecoil, thus at least 20 percent of hearing aid users will be able to use a digital wireless phone with their hearing aids equipped with a telecoil

Several consumer organizations find the use of accessories objectionable claiming that they are difficult to use, inconvenient and distinguish an individual who is hard of hearing from a hearing person. This is no longer the case. Hands-free devices are now common accessories used with mobile phones and are required while driving in some states. Thus, use of such accessories does not necessarily distinguish an individual who is hard of hearing from a hearing person. For those consumers who find accessories too difficult to use or inconvenient, they may prefer another approach such as a hearing aid with a higher immunity level. With appropriate and broader consumer education and training efforts, ease of use can be successfully addressed.

Moreover, the wireless industry continues to explore options for increasing the distance between the digital mobile phone and the hearing aid. For example, several wireless and hearing aid manufacturers are exploring the use of Bluetooth technology in both the hearing aid and the digital wireless phone as another method of increasing the distance between the hearing aid and the phone.[44] While the research is not complete, manufacturers are hopeful that the use of this new technology may provide additional usability in the future.

C. ANSI C63.19 standard

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[44] Steve Coston, Technical Manager for Regulatory Services, Sony Ericsson, *Presentation at FCC Tutorial on Wireless Phones and Hearing Aid Usability.*

The ANSI C63.19 standard is another tool that may provide consumers with an easy and predictable method of determining if a specific digital wireless phone and hearing aid combination can be expected to work well together. It is designed to provide consistent testing protocols for assessing the immunity of hearing aid devices and the mobile phones' RF emission. The standard provides categories for the respective levels of immunity and RF emissions. This allows the consumer to pair a hearing aid with a particular immunity level with a digital wireless phone RF emission level to determine their potential to use both devices together.

The Notice inquires about the viability of the ANSI C63.19 standard for consumers and whether it would satisfy the technological feasibility provision with respect to the Commission limiting the exemption for mobile phones.[45] This line of inquiry is premature. The standard has yet to be implemented, thus consumers, wireless phone manufacturers and service providers and hearing aid manufacturers have not had any experience in using the standard in order to make an informed decision regarding its viability and usability. While it is too soon to evaluate the effectiveness of the ANSI C63.19, this in no way suggests that the stakeholders should abandon their efforts.

The wireless industry, however, has encountered several issues that must be resolved before moving forward with implementation. First, hearing aid manufacturers are not ready to move forward with implementation at this time, and their participation is critical. Unless the wireless and hearing aid industries implement the standard concurrently, consumers will be unable to utilize the "pairing" approach. Second, the standard requires both wireless phone manufacturers and hearing aid manufacturers to define the respective RF emissions and immunity levels of their products. Such implementation requires a significant expenditure of

R&D resources that cannot be justified without a commitment from the hearing aid industry to implement the standard concurrently. Third, the standard has not been sufficiently tested in the "real world" to know how it will perform. Such testing will require the cooperation of consumers, wireless and hearing aid industries working together. .

The wireless industry acknowledges that development, adoption and now the implementation of the ANSI C63.19 standard has been a challenging, yet necessary and beneficial endeavor for both wireless and hearing aid manufacturers. The development of the standard has provided a better understanding of RF interference issues; has led to the innovation of patents and test methods, and has provided a baseline for developing hearing aids and digital wireless phones on a going forward basis.

D. Both Europe and Australia are managing the RF interference phenomenon by employing a pragmatic and common scientific approach.

In Europe and Australia, RF interference and hearing aid susceptibility issues are managed by employing a scientific-based approach that has focused on increasing the immunity of the hearing aid, increasing the distance between the phone and the hearing aids, and extensive public education. The European and Australian efforts offer effective models in addressing the same technical challenges in the United States.

As discussed previously, the European and Australian research concluded that while the essential nature of digital mobile phones, *i.e.,* the intentional emission of RF signals, is one significant factor in the level of interference, eliminating, reducing or shielding this intentional transmission of RF signals is not a technically viable option if the phone is to operate

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[45] Notice, at ¶ 26.

effectively.[46] Accordingly, European and Australian research efforts and standards-setting activities have focused on resolving interference by increasing the immunity level in hearing aids.[47] .

In both Europe and Australia, hearing aid manufacturers are incorporating Class 1 and Class C1 standard, respectively, into their products. While this will resolve the susceptibility of the hearing aid to by-stander or far-field interference, Australian researchers and technical experts strongly recommend that all hearing aids comply with the Class C2 standard. "Unless hearing aids comply with the Class C2 standard, affected hearing aid wearers will only be able to use a digital mobile phone in conjunction with accessories, and, even then, interference may not be eliminated in all cases."[48] CTIA understands that the Australian Therapeutic Goods Administration is considering mandatory compliance with Class C2 standard. In Europe, IEC is in the process of developing a Class 2 standard for hearing aid immunity.

Despite extensive and on-going research efforts and standards-setting activities to address the hearing aid susceptibility and RF interference issue, European and Australian organizations that represent the hard of hearing and deaf community, like their American counterparts, have expressed their frustration and displeasure with the gradual progress of this pragmatic and

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46 See infra Section II.

47 See NAL CDMA Report Phase I, at 4; NAL Report No. 131, at 4, Denmark Study, at 30; Lauridsen Study at 11, Telstra Submission, at 3, EHIMA Final Report, at 5. See also EMC Directive 89/336/EEC

48 Telstra Submission, at 3. See also, NAL Report No. 131, at 49.

scientific approach. Similar to Wireless Access Coalition, they have called upon their respective government agencies to find a way to resolve the issue[49].

In September 1999, the Australian Human Rights and Equal Opportunity Commission issued a Notice of Inquiry concerning a complaint it had received from a group of people with hearing impairments about the difficulties they had in using GSM digital mobile phone services and perceived problems with CDMA.[50] Interestingly, while the Australian HREOC explained the rights and responsibilities of consumers, mobile service providers, retailers, equipment manufacturers, and hearing aid manufacturers and retailers under the Australian Disability Discrimination Act, the HREOC also recognized the benefits and limitations of different options available for Australian consumers who wear hearing aids.[51]

Several organizations submitted comments acknowledging the Australian wireless industry's extensive efforts and participation in addressing this issue. They also noted that resolving this issue does not rest solely with the wireless industry but also requires a concerted effort of the hearing aid manufacturers, namely increasing the immunity level of hearing aids.[52] While the HREOC failed to address this issue in the Report, Australian researchers remain firm that increasing the immunity level of hearing aids and increasing the distance between the hearing aid and the digital wireless phone is the most technically viable approach

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49 Australian Human Rights and Equal Opportunity Commission, *Notice of Inquiry under the Disability Discrimination Act 1992*(visited Jan. 10, 2002) http://www.hreoc.gov.au/disability_rights/inquiries/notice2.,

50 Id.

51 Id.

52 Id.

The Australian HREOC report concluded that both consumers and the service providers would benefit from self-regulation through the development and use of an industry code of best practices with respect to customer information on prices, terms and conditions. The HREOC also allowed the industry and representatives of the complainants negotiate a mechanism for remedying individual cases.[53]

In 2001, three wireless service providers serving Australia launched an approach that provide options to Australian consumers who use hearing aids and want to access GSM and CDMA mobile phone networks. Specifically, the options are: 1) service providers may offer to provide accessories to facilitate the GSM mobile network, or 2) service providers may provide consumers with an opportunity to change to the CDMA mobile network in some circumstances, where a person meets certain eligibility criteria. The approach also involves significant consumer education campaign, *i.e.,* providing informational brochures in service providers' stores and making sure that the brochures are widely available and easy to access, and training seminars for consumers.

There are important lessons that the stakeholders and the Commission can learn from the international experiences, particularly the Australian experiences. The Commission and the FDA should not ignore that efforts to increase the hearing aid immunity level are necessary if wireless consumers in the U.S. who wear hearing aids or who have cochlear implants are to use digital wireless phones and other digital devices in a meaningful way. Furthermore, the Commission should maintain its long-established policy regarding technology neutral solutions, and should not dictate that consumers should use one digital technology over another. It is inappropriate and bad policy for the Commission or any government agency to suggest that one

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53 Id.

digital technology has an advantage over the other. Rather, the Commission should continue to allow consumers to determine which digital technologies best meet their needs. Finally, the Commission should not limit consumers' options with respect to accessories, particularly when the evidence demonstrates that such accessories provide a way to increase the distance between the hearing aid and the digital wireless phone and are now being commonly used by all consumers of wireless devices.

The key to successful implementation of the approaches outlined in these comments is education, not only consumer education, but also internal training and education within wireless and hearing aid companies. The wireless industry is prepared and willing to provide education and information to consumers, the hearing aid industry, audiologists and hearing specialist and wireless industry customer care, sales and marketing personnel. Education efforts, however, should not be limited to the wireless industry. The hearing aid industry must provide education and information to its customers and hearing professionals. Audiologists and hearing specialists must provide their clients with information on selecting and using the appropriate digital wireless phones with their particular hearing aids.

CONCLUSION

For the reasons set forth above, CTIA recommends that the Commission do not revoke or limit the exemption for mobile phones from the Commission's hearing aid compatibility rule, and urges the Commission to adopt a multifaceted approach that achieve access through usability rather than internal coupling. CTIA strongly encourages the Commission to seek the assistance of the FDA, particularly with respect addressing higher immunity levels for hearing aids manufactured or sold in the United States, and to consider carefully the scientific-based approach supported by European and Australian researchers, technical experts and standards-setting bodies.

Respectfully submitted,

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